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(54) IMPROVEMENTS RELATING TO IRON-ON INLAY MATERIALS

(71) We, CARL FREUDENBERG, a German Company (a Kommanditgesellschaft, the present personally responsible partners of which are HELMUT FABRICIUS, HANS ERICH FREUDENBERG, OTTO SCHILDHAUER, HERMANN FREUDENBERG, DIETER FREUDENBERG, REINHART FREUDENBERG), of 6940 Weinheim/Bergstrasse, Hohnerweg 2, Germany, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to iron-on inlay materials of the type comprising a woven, knitted or non-woven fabric with thermoplastic adhesive applied to one face.

Many different iron-on inlay materials of this kind have already been proposed, particularly materials formed from non-woven fabrics. The non-woven fabrics are usually produced by means of roller cards or flat cards, and the fibres are either oriented parallel to the direction of production (longitudinal non-woven fabrics) or they are arranged by means of crosslayers of an angle, which can be freely chosen, to the direction of production. In this case the fibres are mostly lying crosswise in several layers over one another (crosslaid non-woven fabrics). Also, combined non-woven fabrics of longitudinally and crosslaid fibres are known.

The non-woven fabrics often consist of a mixture of several fibre types, for example a mixture of regenerated cellulose and polyamide fibres, or a single fibre type which is used in different titers, such as a mixture of regenerated cellulose fibres with the titers 1.7, 3.0 and 6.6 den. Mixtures are also known consisting of different kinds of fibres with different titers and states of crimp, for example a mixture of highly crimped 3.3 den. nylon and normally crimped 1.7 den. polyester. Non-woven fabrics of the above described kind generally consist of the types of natural or synthetic fibres which are also used for other textile flat-shaped woven or knitted materials, which are of, for example, wool, cellulose, cellulose acetates, polyamides, polyesters, polyolefines or polyacrylonitriles. These fibres always have very little shinkage. This effect, which is deemed important, is usually achieved by means of heat influence during the production of the fibres, or by means of subsequent processes which are carried out on the fibres themselves or on the woven, knitted or non-woven fabrics which are produced from the fibres. For instance, the action of heat, hot water, steam or chemicals is used, so that even flat textile articles become substantially non-shrinkable within certain limits.

It is known to largely disshrink fibres during the production of non-woven fabrics. For this purpose, the fibres, which were arranged by flat cards or roller cards and perhaps by means of a crosslayer with the method initially described, are impregnated or sprayed or printed in predetermined patterns with a liquid binder or with a bonding agent in water or another solvent, and are then dried with hot air, contact heat, radiation or another heat medium. Thus, a prefixed non-woven fabric band results, the portion of bonding agent of which can be cured or vulcanized by means of additional heating. The heat treatments let the fibres largely shrink out, so that in the end a non-woven fabric band results which has little shrinkage.

The heat shrinkage of a thus produced non-woven fabric band is small, for example

only ±2% in both length and cross-directions. Woven or knitted fabrics which were subjected to heat or chemical effects during the course of their finishing show, in general, comparable shrinkage values.

Non-woven and woven fabrics of this kind have for a long time been used as textile inlay materials in the clothing industry. In recent times, the non-woven fabrics, wovens and sometimes knitted fabrics for use as inlay materials have been coated with thermoplastic adhesives. These adhesives are generally of polyethylene, polyamides, polyurethanes, and/or polyvinylchloride and have the effect that the inlay materials can be ironed together with a textile outer material. Such iron-on inlay materials are called "Fusible Interlinings". They considerably simplify the manufacturing process of clothes as a result of the elimination of some of the sewing work.

Iron-on inlay materials comprising non-woven fabrics are used on a large scale in the manufacture of ready-made articles of ladies' clothing, for example costumes, jackets and coats, for the stiffening and shaping of the breast and tail parts. Iron-on inlays are used for men's clothing too, for example sports jackets, leisure jackets and coats. However, iron-on inlays of the traditional type are only suited for use in conventional men's coats under certain conditions. This is owing to the fact that the consumer wants the lower part of the jacket to adjust to the body's curves and not to point to the outside of the edge which runs downwards from the closing button. This pointing away is called "turning up of the jacket edge" and has been observed with most kinds of known non-woven inlays and is also observed with many iron-on woven inlays.

As the use of iron-on inlays means a considerable simplification of the manufacturing process of ready-made clothes and inlays based on non-woven fabrics are particularly suitable, a big demand exists for such an inlay material which renders possible the production of men's jackets with a jacket edge which bends or adjusts in the direction of the body of the wearer. On the one hand this would change the outer appearance of the jacket advantageously and on the other hand the production of the jacket in the ready-making process would be simplified. Up to now it has been necessary, in order to prevent a rolling up of the jacket edge, either to sew a textile band from the closing button downward into the edge, or to shorten the seam at the edge of the jacket, or to bring in the so-called "inner trimming" in a shortened proportion. Often, these measures are combined with each other. The amount of work—which is important—could, however, be saved if the inlay material possessed such properties that directly after the ironing onto the surface material, the edge of the jacket would conform to the wearer's body.

According to the present invention, an iron-on inlay material comprising a woven, knitted, or non-woven fabric provided with a thermoplastic adhesive in a conventional manner on one face consists at least partially of heat-shrinkable synthetic fibres which suffer a length shrinkage of at least 10% of the fibre length under the action of heat and/or steam within the temperature range of 40°C to 150°C, whereby ironing the inlay material onto a suitable fabric results in a laminate which is bent or curved in the direction of the inlay material.

The heat-shrinkable synthetic fibres may be fibres which are conventionally used in forming inlay materials, but in making the material in accordance with the invention, the fibres will not be pre-shrunk, or will only be incompletely pre-shrunk, in the manufacture or finishing of the material. During the ironing together of the resulting inlay material with a textile fabric under the influence of the required heat and/or steam, the fibres continue to shrink whereby the laminate becomes bent or curved in the direction of the inlay material.

Depending on how the shrinkage of the shrinkable fibres is effective in different directions within the inlay material, the bent or curved laminate may form the partial surface of a cylinder or a ball or another curved body, e.g. the partial surface of an ellipsoid or parabolic or a hyperbolic body.

If the laminate is used in making the front part of a jacket, the front part bends in the direction of the wearer and is preferably parallel to the axis of the wearer's body. The cutting line through such a front part of a jacket, at right angles to the axis of the body, can represent the curve on a circle, an ellipse, a parabola, or a similar bent line. The angle of the bent laminate can be up to 180° of arc, but is preferably from 1° to 45°. In the case of a laminate having an arcuate shape the curve can be defined by the angle which is subtended by the arc at its centre of curvature. This angle may be up to 180° but is preferably from 1° to 45°.

Polyolefine, polyamide, polyester, polyacrylonitrile, polyvinyl chloride, polyvinylidene chloride, polyvinyl acetate, polyacrylate and polyurethane fibres, and various mixtures thereof, are known. Fibres of these materials can be used in the production of inlay materials according to this invention, but they must be selected from those which have the particular property that they shrink under the influence of heat and/or steam in the temperature range of 40 to 150°C and suffer, within this range, a decrease in length of at least 10% with respect to the starting length of the fibres.

The following is a list of particular ex-

amples of fibre types which can have the necessary shrinkable characteristics and which then can be used in the materials of the invention: polypropylene e.g. Meraklon; undrafted or partially drafted polyesters e.g. Diolen, Grilene, Fortrel, Dacron and Kodel; mixed polymers of vinylchloride and vinylacetate e.g. Vinyon; polyvinylchlorides e.g. Rhovyl and Leavil; copolymers of polyvinylidene chloride and vinyl chloride e.g. Saran; copolymers of polyethylene and polyvinyl alcohol or polyvinyl acetate e.g. Acralen; multipolymerisates e.g. Dynel, Verel and Acrilan; and copolyamides of nylon 6 and/or nylon 66 and/or nylon 11 and/or nylon 12. ("Dacron", "Kodel", "Vinyon", "Saran" and "Dynel" are Registered Trade Marks.)

Even if some of these shrinkable fibres have to be excluded from iron-on inlay materials because of their melting point which should, as a rule, be above 180°C for the described purpose, the present invention is not limited by the melting behaviour of the shrinkable fibres. In principle, in order to achieve curved laminates, any synthetic fibre having the required shrinkage characteristics is suitable.

The greater the fibre shrinkage and the greater the proportion of the shrinkable fibres in the inlay material, the more severe is the bend or curve of the laminate which is obtained. Furthermore, the degree of the bend or curve can be varied in many cases by means of the temperature at which the inlay material is ironed onto a fabric to form a laminate. Therefore, the proportion of shrinkable fibres needed within the inlay material is dependent on the kind of shrinkable fibres, on the temperatures which are effective during the production of the inlay material and the ironing process, and on the desired extent of the bend or curve. The required proportion of shrinkable fibres can therefore be within wide limits e.g. from 2 to 100%, but preferably it is from 2 to 40% and more preferably from 4 to 20%, of the total amount in the inlay material. There are preferably more than 50% of non-shrinkable fibres in the fabric. These can be of any known type e.g. polyamide and are suitably smooth or crimped. The bend or curve is influenced by the non-heat-shrinkable synthetic fibres in the inlay material, and by the shrinkage properties of the outer fabric with which the laminate is formed. As the shrinkage characteristics of suitable outer fabrics are not identical, it is another important advantage of the invention that an inlay material of the invention can be adapted by varying the ironing temperature to the respective shrinkage properties of the outer fabric, in order to achieve the desired bend or curve in the laminate.

The temperatures that are used during the production and the finishing of the inlay material are such that the shrinkable fibres do not shrink or are shrunk by not more than 90% and preferably by not more than 50% of the total shrinkage which occurs at 150°C. Care is taken that the shrinkage properties of the shrinkable fibres that are used are retained completely or to a high degree, i.e. to a degree of at least 10%, in order to have sufficient residual shrinkage when the inlay material is ironed on a suitable outer fabric at the specific temperature required for this purpose. If, for example, the ironing-on temperature is 150°C, the maximum temperature which can be employed during the production and the finishing of the inlay material is 145°C, and preferably 100 to 140°C, depending on the kind of shrinkable fibres employed and the other chemical ingredients which may be used.

In certain cases, for example when undrafted polyester fibres are used as the shrinkable fibres, higher temperatures during the production and the finishing of the inlay material can be employed without adversely affecting the desired effect.

As the inlay material of the invention may comprise a woven, knitted or non-woven fabric, there are various possibilities for inserting the shrinkable synthetic fibres.

If the inlay material of the invention comprises a woven or knitted fabric, the yarns of threads from which the fabric is produced may consist wholly or partially of the shrinkable fibres. In woven fabrics the shrinkable fibres may be arranged in only the warp or woof threads. If the fabric contains the shrinkable fibres in the woof direction only, after the ironing process the resulting laminate bends in the woof direction and parallel to the warp direction. If the front part of a man's jacket is cut in the warp direction, the edge of the front part turns in the manner of a cylinder surface to the side of the inlay material.

If the inlay material of the invention comprises a non-woven fabric, there are many more possibilities for the insertion of the shrinkable synthetic fibres.

The fibres of the non-woven fabric may be arranged in one or several layers parallel or crosswise, and in the case of several layers the fibres may be arranged parallel in some layers and crosswise in others. Each layer can be wholly or partially of shrinkable synthetic fibres.

In the most simple cases, each fibre layer consists wholly or partially of the shrinkable fibres in a substantially homogeneous, symmetrical distribution within the non-woven fabric. However, when the non-woven fabric consists of several layers, the shrinkable fibres may only be contained in one or some, but not in all, of the fibre layers. In these cases it is advantageous that the layers containing the shrinkable fibres are arranged asymmetrically within the non-woven fabric, i.e. for example, the shrinkable fibres in a three-layer non-

woven fabric are not in the middle layer but in one of the two outer layers. The advantage of an asymmetric arrangement is that a reinforced curved laminate is obtained with a smaller quantity of shrinkable fibres than is necessary to obtain the same bend or curve if the fibres are distributed homogeneously in the fabric. As the bend or curve is supposed to take place in the direction of the inlay material, in these cases the thermoplastic adhesive has to be applied to the fibre layer which is free of shrinkable fibres. In the opposite case the laminate would bend or curve increasingly to the undesired side of the surface material.

The reinforcing effect as a result of the asymmetric arrangement is only possible in the case of inlay materials comprising several layers. Non-woven fabrics with several layers can be produced without technical difficulties with several carding machines. Woven or knitted fabrics with several layers can be conventionally produced without technical difficulties by laying the threads in a weaving or knitting machine. Woven fabrics of this type can be produced by, for example, the so-called double-weave method. It is possible to make the asymmetric arrangement of the shrinkable fibres visible in the non-ironed material by heating it, for example in a drying oven, to the temperature at which the shrinkage starts. The inlay material bends or curves to the side which contains the shrinkable fibres. The same result is achieved if such a non-woven fabric is heated to this temperature during the process of production. An inlay material with a homogeneous distribution or shrinkable fibres, however, remains flat when given such treatment, and only the laminate obtained by ironing it to a surface material will bend or curve. If, in the case of asymmetric distribution, a bend or curve is already given to the inlay material, it is to be understood that the bend or curve after ironing to form a laminate becomes greater.

As in woven fabrics, it is also possible to predetermine the direction in which the bend or curve is to be effected in non-woven fabrics. For example, if one arranges the shrinkable fibres in the longitudinal direction only, the bend is preponderantly in the length direction. If the arrangement of the shrinkable fibres is in the cross-direction of the non-woven fabric, the bend or curve will occur substantially in the cross-direction. If one cuts the inlay material for the front part of the man's jacket in the longitudinal direction of an iron-on inlay material which consists of a longitudinally-laid fibre layer without shrinkable fibres and a cross-laid fibre layer with shrinkable fibres and which carries the thermoplastic adhesive on the longitudinally-laid fibre layer, after ironing it together with the surface material, a jacket front part is obtained which bends towards the wearer substantially around the vertical axis of the wearer. Such a man's jacket has an ideal appearance and the application of additional ready-making techniques as described earlier are unnecessary.

In view of the number of possible combinations as described earlier for single and multiple layer non-woven fabrics, it is possible that such fibre mixtures have been used already which contain portions of shrinkable fibres which may possibly have possessed a residual shrinkage potential after the production of the non-woven fabric. However, such non-woven fabrics containing shrinkable fibres are unknown as iron-on inlays having the special property described for the purpose of forming laminates, by ironing the inlay together with a textile fabric, which bend or curve in the direction of the inlay non-woven fabric. It cannot be presumed that the properties of the inlay materials of the invention could have been foreseen, since the testing methods which are usually employed for the measurement of flat textile materials, e.g. according to DIN 53,894, pages 1 and 2, do not specifically describe the inlay materials. DIN 53,894 describes the determination of the dimensional change of flat textile materials by ironing with a damp ironing cloth and a heated metal plate (page 1), and by steaming on steam ironing machines (page 2). According to these DIN prescriptions, in the case of inlay non-woven fabrics in accordance with the invention, shrinkage values may be obtained, and they are measured as with other inlay materials, i.e. as decreases or increases in length. An increase in length will often be measured in the cross-direction of an inlay material of the invention, but this does not mean that a laminate having such a length increase measurement will have been produced using an inlay of the invention.

The fabrics used in this invention preferably exhibit a width decrease of about 0.8% or a width increase of about 1.0% in the warp or cross-direction when ironed onto a suitable fabric to form a laminate.

Several Examples of inlay material in accordance with the invention will now be described to illustrate the invention in more detail.

Example 1

On a non-woven fabric forming machine which contains a longitudinally-laying flat card, a single-layer longitudinally-laid fibre nap of 40 g/m^2 is prepared which comprises 60% polyester fibres of 33 den., 30% regenerated cellulose of 1.7 den., and 10% isotactic polypropylene of 1.7 den. (Meraklon).

This nap is then impregnated in a known manner with a foamed mixture of a bonding agent which is a copolymer of butadiene, acrylonitrile and methacrylic acid which is commercially available as Perbunan N-Latex 3415. ("Perbunan" is a Registered Trade

Mark.) After impregnation it is dried in a hot air dryer at 125°C and the dried non-woven fabric is vulcanized in a heatable chamber for 1 1/2 hours at 115°C, converting the Perbunan bonding agent from a plastic state to an elastic state and rendering the fabric resistant to chemical cleaning agents.

The vulcanized non-woven fabric has a weight of 55 g/m², which corresponds to a proportion of fibre: bonding agent of 73:27.

The non-woven fabric is then printed on one surface with 25 g/m² of thermoplastic adhesive. The adhesive consists of copolyamide with a melting point of 120°C which is converted, for the printing process, by elutriation in water and the addition of polymethacrylic acid and ammonia as thickening agent, into a printing paste with a viscosity of 25.000 cP. After the printing of the paste in the form of geometrically regularly or irregularly arranged points or lines, the printed non-woven fabric is again dried in a hot air dryer at 115°C whereby the water in the adhesive paste evaporates. The finished non-woven fabric, which can be ironed on a suitable textile fabric, has a weight of 80 g/m² and forms, after ironing in an ironing press having two flat plates, a laminate which bends to the side of the non-woven fabric and in the fibre direction of the non-woven fabric.

Example 2

On a non-woven fabric forming machine which contains two cross-arranged roller cards each with one cross-layer, a two-layer fibre non-woven fabric of 40 g/m² is formed. In both layers, each of 20 g/m², the fibres are arranged by means of the action of the cross-layer at an angle of 45°. The fibre mixture consists, in both layers, of 60% highly crimped nylon of 3.3 den., 25% normally crimped polyester fibres of 1.7 den., and 15% undrafted polyester fibres of 6 den.

The two superimposed fibre layers are impregnated in known manner with a foamed mixture of a bonding agent which is a butadiene-acrylonitrile copolymer available as Hycar 1570 H 36 ("Hycar" is a Registered Trade Mark), which is self-crosslinking in an acidic medium. As a catalyst, the mixture contains ammonium chloride. After the impregnation the fabric is dried in a hot air drier at 125°C and cured at the same temperature, whereby the bonding agent cures and becomes resistant to dry cleaning agents. The cured non-woven fabric has a weight of 53 g/m², which corresponds to a proportion of fibre: binder of 75:25.

As in Example 1, the printing of a copolyamide thermoplastic adhesive is effected subsequently on one side of the non-woven fabric. The finished iron-on inlay material weighs 78 g/m² and forms, after ironing it in a flat ironing press onto a suitable textile material, a laminate which curves in the longitudinal and cross-directions to the side of the non-woven fabric.

Example 3

On a non-woven fabric forming machine which consists of a longitudinally-lying and a cross-lying flat card, a two-layer non-woven fabric of 45 g/m² is formed. The longitudinally-laid fibre layer of 30 g/m² consists of highly crimped nylon of 1.7 den., and the cross-laid fibre layer of 15 g/m² consists of a mixture of 70% highly crimped nylon of 1.7 den. and 30% undrafted polyester fibre of 3 den. (Fortrel).

The impregnation, drying and curing is effected as in Example 2, except that the bonding agent used is Acronal 35 D, a self-crosslinking polyacrylate polymer, the cross-linking capacity of which is increased by the addition of ammonium oxalate to the bonding agent mixture. ("Acronal" is a Registered Trade Mark.) After curing, the non-woven fabric has a weight of 60 g/m² and is subsequently printed with 20 g/m² of a copolyamide thermoplastic adhesive, and this is done to the longitudinally-laid fibre layer. The subsequent drying is effected at 115°C.

If one irons this inlay non-woven fabric at 150°C onto a textile fabric, a laminate is obtained which curves towards the non-woven fabric and in the cross-direction of the non-woven fabric. If one cuts from this material the front part of a man's jacket so that the longitudinally laid fibres run parallel to the axis of the wearer's body, the jacket edge turns towards the body of the wearer.

Example 4

As in Example 3, a two-layer non-woven fabric of 45 g/m² is prepared and impregnated with a foamed bonding agent consisting of Acronal 35 D, but with an increase in weight of only 5 g/m². The fabric is printed subsequently with 20 g/m² of Acronal 35 D in geometrical patterns.

For this purpose polymethacrylic acid and ammonia is added to the bonding agent to thicken it into a printable paste. The drying and curing is effected on cylinder driers at 125°C.

The printing of thermoplastic adhesive, which may consist of copolyamide or of polyvinylchloride, is effected as in Example 3, and the drying to achieve gelation of the polyvinylchloride is effected at a maximum of 120°C. The iron-on non-woven fabric is remarkable because of an especially textile-like, soft touch, and forms laminates as described in Example 3.

Example 5

On a non-woven fabric forming machine comprising a longitudinally-laying and two cross-laying roller cards, a three-layer non-

woven fabric of 45 g/m² is formed whereby each layer weighs 15 g/m².

The longitudinally laid fibre layer consists of normally crimped Perlon of 1.7 den. ("Perlon" is a Registered Trade Mark), the middle cross-laid layer consists of highly crimped nylon of 1.7 den., and the outer cross-laid layer consists of 75% highly crimped nylon of 1.7 den. and 25% undrafted polyester fibre of 3 den. (Fortrel).

The impregnation, drying and curing is effected as in Example 3 or 4. The adhesive is applied to the longitudinally-oriented fibre layer and is dried and gelatinized at a maximum of 120°C. The laminate which can be obtained curves as in Example 3 or 4, and it is remarkable because of its especial surface smoothness.

Example 6

On a non-woven fabric-forming machine with two cross-laying roller cards, fabric layers with the following composition are formed:

a) 60% nylon 66	3.3 dtex
15% nylon 66	1.7 dtex
10% polyester	3.3 dtex
15% regenerated cellulose	2.8 dtex
b) 60% nylon 66	3.3 dtex
15% nylon 66	1.7 dtex
10% polyester undrafted	
15% regenerated cellulose	

Together, the non-woven fabrics have a weight of 45 g/m² before the impregnation. Subsequently they are impregnated with foamed polyacrylic acid ester latex such that the total weight is 60 g/m². Drying and curing are in this example effected at 150°C and three minutes of pure curing time are sufficient. The measurement of the crimping of the inlay material shows that, according to DIN 53,894, the non-woven fabric being built up in two layers does not show crimping on the whole and that in both directions an elongation of 0.2 and 0.5% respectively is observed. The adhesive described in the preceding examples is pressed onto the surface of the fibre layer a) and is dried and gelatinized at 120°C. The laminate produced from this non-woven fabric and an outer fabric which has been ironed-on under a fixing press at 150°C curves somewhat less than in Example 3 but it still clearly bends visibly towards a wearer's body.

Example 7

On a weaving loom, a web of about 100 g/m² is produced which contains in the warp direction cotton yarns of yarn strength Nm 20 in a density of 15 threads per cm, and in the weft or woof direction yarn of strength Nm 20 in a density of 10 threads per cm and consisting of 85% regenerated cellulose and 15% undrafted polyester.

The finished crude web is desized by known methods, washed and saturated with a dilute solution of a urea-formaldehyde resin (Knittex—a Registered Trade Mark), and then dried at 125°C on a tentering frame. Subsequently, a unilateral coating of thermoplastic adhesive comprising copolyamide or polyvinylchloride is effected and the drying and gelation is carried out at a temperature of 120°C.

An iron-on inlay material produced in this way can be ironed together with a textile fabric to produce a laminate which bends mainly in the weft direction. If one cuts the front part of a man's jacket from such material so that the warp threads of the inlay material run mainly parallel to the body axis of the wearer, the jacket edge curves towards a wearer's body.

In the accompanying drawings:

Figure 1 is a section through a laminate formed by ironing an inlay material in accordance with the invention onto a suitable textile fabric. The laminate is shown curved through 180° or arc, with the inlay material on the inside of the curve.

Figure 2 is a view similar to that of Figure 1 but showing the laminate curved through only a 45° arc, i.e. the laminate subtends an angle (α) of 45° at the centre of curvature of the laminate.

Figure 3 illustrates diagrammatically an inlay material 1 in accordance with the invention prior to being ironed together with a textile fabric surface layer 2. The multi-layer non-woven inlay material 1 comprises a pair of ordinary fibre layers 3 and a layer 4 containing shrinkable fibres, and adhesive 5 applied to the surface remote from the shrinkage layer 4.

Figure 4 illustrates the laminate 6 obtained by ironing together the materials 1 and 2 shown in Figure 3, the shrinkage layer being on the inside of the curve.

WHAT WE CLAIM IS:—

1. Iron-on inlay material comprising a woven, knitted or non-woven fabric carrying thermoplastic adhesive on one face, in which the fabric consists at least partially of heat-shrinkable synthetic fibres which suffer a length decrease of at least 10% of the initial fibre length under the influence of heat and/or steam within the temperature range of 40°C to 150°C, whereby ironing the inlay material onto a suitable fabric results in a laminate which is bent or curved, with the inlay material being on the inside of the curve.

2. Iron-on inlay material according to Claim 1 in which the fabric contains from 2 to 40% of the heat-shrinkable synthetic fibres.

3. Iron-on inlay material according to Claim 2 in which the fabric contains from 4 to 20% of the heat-shrinkable fibres.

4. Iron-on inlay material according to any preceding Claim in which the fabric comprises more than 50% of non-shrinkable synthetic fibres.

5. Iron-on inlay material according to Claim 4 in which the non-shrinkable fibres are smooth or crimped.

6. Iron-on inlay material according to Claim 4 or Claim 5 in which the non-shrinkable fibres are polyamide fibres.

7. Iron-on inlay material according to any preceding Claim in which, during its production and finishing, the heat-shrinkable fibres have been shrunk to a degree whereby they may be shrunk by at least a further 10% of their initial length under the influence of heat and/or steam within the temperature range of 40°C to 150°C.

8. Iron-on inlay material according to Claim 7 in which, during its production and finishing, the heat-shrinkable fibres have been shrunk by up to 50% of the total shrinkage which occurs at 150°C.

9. Iron-on inlay material according to any preceding Claim in which the fabric is a woven or knitted fabric in which the yarns or threads partially comprise the heat-shrinkable fibres.

10. Iron-on inlay material according to any of Claims 1 to 8 in which the fabric is a non-woven fabric comprising a fibre mixture which consists at least partially of the heat-shrinkable fibres, and a bonding agent and/or bonding fibres.

11. Iron-on inlay material according to Claim 10 in which the fabric is a bonded non-woven fabric comprising a plurality of layers in each of which the fibres are arranged parallel or crosswise, and the fibres of each layer consist at least partially of the heat-shrinkable fibres.

12. Iron-on inlay material according to Claim 10 in which the fabric is a bonded non-woven fabric comprising a plurality of layers in each of which the fibres are arranged parallel or crosswise, and the fibres of at least one, but not all, of the layers consist at least partially of the heat-shrinkable fibres.

13. Iron-on inlay material according to Claim 1 substantially as described with reference to any of the Examples.

14. A curved laminate comprising iron-on inlay material according to any preceding Claim ironed onto one face of a textile fabric, in which the curve is towards the inlay material.

15. A laminate according to Claim 14 which subtends an angle of from 1 to 45° at the centre thereof.

16. A laminate according to Claim 14 or Claim 15 in which the width of the fabric of the iron-on inlay material has decreased by about 0.8%, or increased by about 1.0% in the warp or cross-direction, during the ironing.

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1486639 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 1

FIG. 1

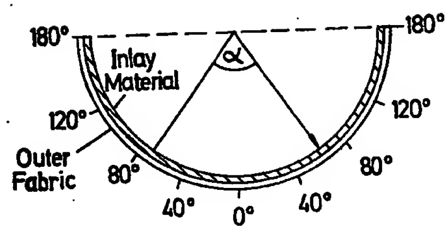
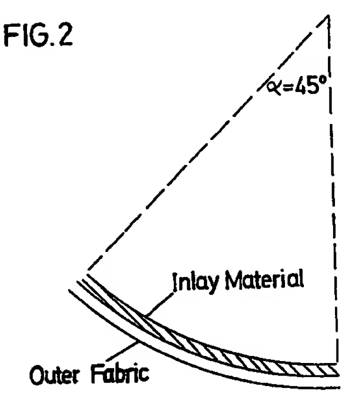


FIG. 2



1486639 COMPLETE SPECIFICATION

2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

FIG.3

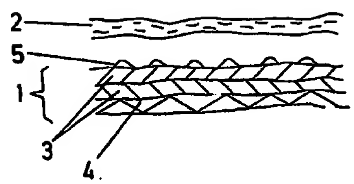


FIG.4